

Section II. REMARKS

Amendment of Claims 1, 5, 6, 15 and 25

Claim 5 has been rewritten in independent form herein, in response to the examiner's statement (last paragraph on page 3 of the November 4, 2005 Office Action) that claim 5 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 5 as amended is therefore in form and condition for allowance.

Claims 1, 6, 15 and 25 have been amended herein to recite specific features of the invention.

Claim 1 has been amended to recite, inter alia, "the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume." Such disclosure is fully consistent with and supported by the original disclosure of the application; see for example¹ paragraph [0034], lines 10-14 ("the internal volume of the conductive block is bifurcated into the interior void space and elongated wells, and preferably the internal volume of the wells is about 1/3 to about 1/2 of the internal volume of the conductive block").

Claim 6 has been amended to recite that "each of said wells has a diameter in a range of from about 3 to 8 millimeters." Such disclosure is consistent with the specification at paragraph [0035], lines 7-9 ("[P]referably, the internal diameter of the wells is in a range of from about 3 mm to about 8 mm").

Claim 15, withdrawn, has been amended for consistency with claim 1, in connection with the prior and hereby affirmed rejoinder request under MPEP 821.04, upon finding of the elected claims to the vaporizer to be allowable.

Claim 25 has been amended to recite "the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the interior volume is in a range of from about 120 cm³ to about 200 cm³, wherein each of the elongated wells in said multiplicity of elongated wells has an internal diameter of from about 3 to

¹ All references herein to the specification of the present application refer to the text of the application as published June 19, 2003 as U.S. Patent Application Publication 2003/0111014.

about 8 mm, and wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume.”

Such recital of claim 25 is fully consistent with the disclosure in the specification at paragraph [0034], lines 10-14 (“the internal volume of the conductive block is bifurcated into the interior void space and elongated wells, and preferably the internal volume of the wells is about 1/3 to about 1/2 of the internal volume of the conductive block”); paragraph [0035], lines 7-9 (“[P]referably, the internal diameter of the wells is in a range of from about 3 mm to about 8 mm”); and paragraph [0034], lines 7-9 (“paragraph [0035], lines 7-9 (“[P]referably, the interior volume of the conductive block is in a range of about 120 cm³ to about 200 cm³”).

No new matter (35 USC 132) has been added.

Rejection of Claims and Transversal Thereof

In the November 4, 2005 Office Action:

claims 1-4, 6-8, 10, 12-14 and 25-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr (U.S. Patent No. 2,447,789, hereinafter Barr) in view of Stall (U.S. Patent No. 5,336,324, hereinafter Stall) and/or Greer, et al. (U.S. Patent No. 5,104,695, hereinafter Greer);

claims 2 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Stall and/or Greer in further view of Tanabe et al. (U.S. Patent Application Publication Number 2001/0008121, hereinafter Tanabe); and

claims 11 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Stall and/or Greer in further view of Holloway (U.S. Patent No. 3,647,197, hereinafter Holloway).

These rejections are hereby traversed in respect of the pending claims as amended herein. Reconsideration of the patentability of the amended claims is requested in light of the following remarks.

Patentable Distinction of the Claims Over the Cited References

Claim 1, rejected under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Stall and/or Greer, et al., now has been amended to recite, *inter alia*,

“the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume.”

The criteria for a for an obviousness rejection under 35 USC §103 are stated in MPEP §2143 (“Basic Requirements for a Prima Facie Case of Obviousness”):

“To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).”

(MPEP §2143)

Here, the requisite basis for an obviousness rejection under 35 USC §103 is absent. The cited references do not in any way teach or suggest a vaporizer with “the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume” (emphasis added).

The primary reference of Barr, in fact teaches away from such allocation of the interior volume between (i) the interior space and (ii) the internal volume of the multiplicity of elongated wells.

The examiner has cited the secondary references of Stall and Greer as providing a motivating basis for one skilled in the art "to modify the vaporizer of Barr for use with particulate screening means of the type taught by Stall and/or Greer, because Barr teaches that his vaporizer can be modified for use with other known particulate screening means, and because Stall and Greer teach that a screening means in the form of a lid that is sealed to the top of a vaporizer container will successfully prevent particulates from escaping from the vaporizer" (page 2, November 4, 2005 Office Action).

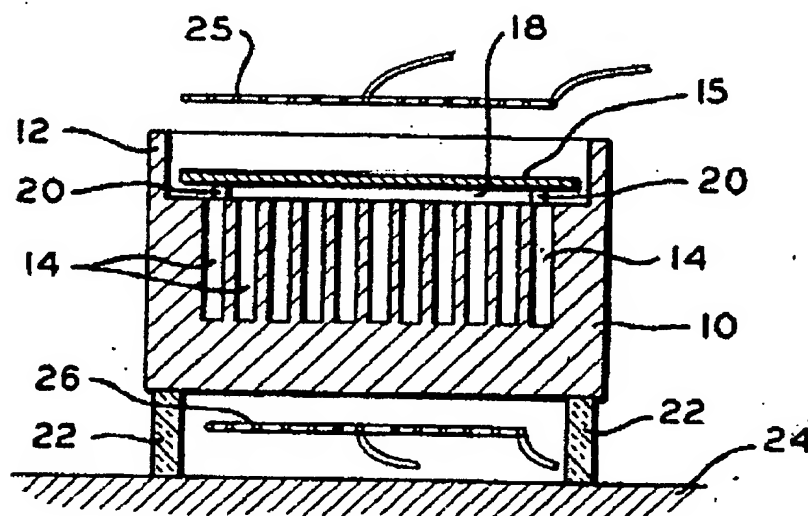
Barr teaches at column 2, lines 15-22 that:

"[I]t is desirable to provide the crucible of the invention with suitable screening means for preventing the escape during evaporation of particles appreciably greater than molecular size. This may be done by any suitable fine mesh screen but preferred results have been obtained with the use of a solid plate 15 of steel or other suitable rigid material." (Barr, column 2, lines 15-22).

Thus, Barr teaches the use of a crucible lid that is either a "suitable fine mesh screen" or a "solid plate."

For ease of reference in the ensuing discussion, Figure 1 of Barr is reproduced below.

FIG. 1



Barr's "suitable fine mesh screen" or "solid plate" (element 15 in the drawing) is mounted over the cavities or cells 14 in the body member 10 "within flange 12 but above the top of body member 10 in

order to leave a space 18 therebetween" (Barr, column 2, lines 28-30). It is logically necessary that there be a space 18 for the vapor to egress from the cells in the body member in the crucible.

Barr teaches that this space 18 is "one-sixteenth of an inch" in vertical height, as determined by the height of the studs 20 that space the lid (element 15) from the top of the body member containing the cells 14 (see Barr at column 2, line 34). Barr also teaches that the cells 14 are "one-half inch in depth" with a diameter of "approximately one-eighth of an inch" when the depth of the body member 10 is "of the order of one inch" (column 2, lines 11-14).

It is apparent from these dimensions taught by Barr that the allocation of volume between head space overlying the cells (between the lid and the face of the body member containing the upper extremity of the cells) and the cells themselves is well outside of applicants' claimed allocation of volume "wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume" as recited in independent claims 1 and 25.

A simple calculation suffices to show this.

Barr teaches that the depth of the body member 10 is "of the order of one inch," as mentioned above. Although Barr does not give the diameter of the body member, it is apparent from the drawing shown in FIG. 1 of Barr (the only structural dimensional guidance for such lateral dimension) that the diameter of the body member does not exceed twice the depth dimension, so that a diameter of two inches would in fact be construing Barr most favorably in this sizing exercise.

At a diameter of 2 inches, the volume of the head space would be $\pi R^2 \times H$ where R is the radius (= 1 inch) of the head space and H is the height (= 1/16 inch) of the head space, so that the head space volume is:

$$\pi R^2 \times H = (3.14)(1)^2 \times (1/16) = 0.196 \text{ inch}^3$$

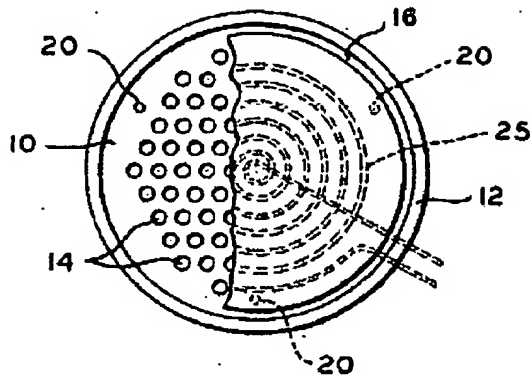
The total volume of the cells in the Barr crucible is $[n \times (\pi r^2 \times h)]$ where r is the radius (= 1/16 inch) of the cell and h is the height (= 1/2 inch) of the cell and n is the number of cells in the body member, so that the total cell volume is:

$$n \times (\pi r^2 \times h) = n \times (3.14)(1/16)^2 \times (1/2) = n \times .006 \text{ in}^3$$

The number n of cells may (again, most favorably to Barr) be based on the number of cells in the elevational cross-sectional view of FIG. 1, in which 11 cells are shown. As shown in FIG. 2 of Barr,

reproduced below for ease of reference,

FIG. 2



in which the circular (cylindrical) character of the crucible is apparent. A physical count of the number of cells in the Barr crucible based on FIG. 2 (extrapolating the pattern shown in FIG. 2 across the full extent of the face of the crucible beneath the overlying plate, then the number of cells is counted as 81, and the total cell volume will be

$$81 \times .006 \text{ in}^3 = 0.486 \text{ in}^3$$

and the fraction of the total (cells + head space) volume occupied by the cells will be

$$0.486 \text{ in}^3 / (0.486 \text{ in}^3 + 0.196 \text{ in}^3) = .713 \text{ in}^3$$

Thus, the cell volume in the Barr crucible constitutes 71.3 % of the total (cells + head space) volume.

The corresponding head space volume portion in Barr is 29.7 %. Barr therefore fails to provide any derivative basis for applicants' claimed vaporizer, as broadly recited in claim 1, "wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume."

In contrast to Barr, the applicants allocate a large portion (from about 1/2 to about 2/3 of the interior volume of the vaporizer block to interior space overlying the wells, because the function of the head space in the applicants' invention is different from that of the head space in Barr.

Applicants disclose in paragraph [0034], lines 10-12 that "[T]he internal volume of the conductive block is bifurcated into the interior void space and elongated wells." The function of the interior void space is described in paragraph [0018], lines 3-6 of the present application:

“[V]aporized source material accumulates within at least the interior void space for release through an outlet that is communicatively connected to a downstream deposition system.”

The head space in applicants' vaporizer is therefore a collection volume for accumulating vapor for dispensing to the downstream vapor-utilizing process, while Barr teaches that

“it is necessary for the vapor to travel first sidewise through space 18 and then upwards through space 16 before leaving the crucible” (Barr, column 3, lines 14-15),

so that Barr uses the head space to direct the vapor laterally to the periphery of the crucible for discharge, and Barr's head space is therefore is very much smaller than applicants' accumulation head space as a part of the total void volume in the vaporizer.

Barr discloses that “screening means other than plate 15 may be used” (column 3, lines 23-24), consistent with his prior statement at column 2, lines 15-22 that:

“[I]t is desirable to provide the crucible of the invention with suitable screening means for preventing the escape during evaporation of particles appreciably greater than molecular size. This may be done by any suitable fine mesh screen but preferred results have been obtained with the use of a solid plate 15 of steel or other suitable rigid material.” (Barr, column 2, lines 15-22).

Based on such disclosure, the Office Action has proposed that a “sealing lid” of “the type taught by Stall and/or Greer” be employed in Barr. Any such sealing lid extracted from these references, however, must, consistent with the disclosure in Barr that

“it is necessary for the vapor to travel first sidewise through space 18 and then upwards through space 16 before leaving the crucible” (Barr, column 3, lines 14-15),

be arranged so that such (Stall- and/or Greer-derived) lid re-directs the vapor laterally to the periphery of the crucible for discharge as the “screening means for preventing the escape during evaporation of particles appreciably greater than molecular size” that is required by Barr.

Concerning Stall in detail, with respect to the FIG. 17a thereof cited in the Office Action, it appears that the Office Action is proposing that the lid of Stall containing passages 1246 and 1250 as shown in FIG. 17a of Stall, be substituted for the “solid plate 15” of Barr, but taking this lid from Stall would

result in top and side openings (passages 1246 and 1250) in the Stall lid being open to flow therethrough unless valve 1234 on rotatable shaft 1218 run by the stepper motor 1232 were "taken along" in such modification of Barr, and operated to position the valve to "close off" passage 1246 to flow since otherwise vapor would flow out of the top of the lid, but in view of the teaching in Barr that

"it is necessary for the vapor to travel first sidewise through space 18 and then upwards through space 16 before leaving the crucible" (Barr, column 3, lines 14-15),

the valve 1234 would need to "close off" both passages 1246 and 1250 of Stall, an impossibility since as shown in FIG. 17b of Stall, the valve 1234 can only close off one of the passages at a time. One skilled in the art facing this impossibility would logically conclude that modification of Barr "a la Stall" as proposed in the Office Action is inconsistent with Barr's crucible and stick with the configuration already disclosed in Barr.

Thus, there is nothing in the Office Action's proposed combination of Stall and Barr that would provide, suggest or extrapolate to a vaporizer with "the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume," as required by claim 1. Further, in light of the foregoing analysis, there is nothing in the references that would motivate their combination.

Accordingly, the proposed combination of Barr in view of Stall fails to meet the prima facie obviousness criteria of 35 USC 103 and MPEP 2143 discussed hereinabove.

Concerning the alternative secondary reference of Greer proposed in the Office Action, Greer discloses a crucible "having an opening and the mesh member is disposed over the opening" (Abstract of Greer, line 9). The mesh member is a mesh screen shown as element 24 in FIG. 2 of Greer and as discussed at column 3, lines 48-50 of Greer the mesh screen can be a tungsten wire cloth 15-20 mills thick and formed of 5 mil diameter wire.

If a Greer-type mesh member were imported into the Barr crucible and substituted for the solid plate 15, as has been proposed in the Office Action (though it is questionable whether one of skill in the art reading Barr's disclosure that the screening means may be "any suitable fine mesh screen but preferred results have been obtained with the use of a solid plate 15 or other suitable rigid material" and seeking

to modify Barr in an improved and beneficial manner would replace the solid plate 15 of Barr with a less-preferred mesh screen from Greer), then the resulting modified crucible would still not yield a vaporizer with "the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume," as required by claim 1.

It therefore is seen that claim 1, as amended herein, is fully patentably distinguished over the cited references and in form and condition for allowance. Since claims 2-4, 6-8, 10, 12-14 and 27-28 depend either directly or indirectly from claim 1, such claims are likewise patentably demarcated over the combination of Barr in view of Stall and/or Greer. Further, since claim 25 contains the same limitation of "the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells,...wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume," claim 25 is likewise patentably distinguished over the cited references and in condition for allowance, along with claim 26 depending from claim 25.

A further and independent ground of patentable distinction is urged in respect of claim 25, in that such claim, as amended herein, requires, *inter alia*, that "the interior volume is in a range of from about 120 cm³ to about 200 cm³." As discussed hereinabove, based on the dimensions given by Barr, the volume of the head space was calculated as 0.196 inch³ and the total cell volume was calculated as 0.713 inch³ so that the total interior volume of Barr is 0.196 inch³ + 0.713 inch³ = 0.909 inch³ = 14.9 cm³. The interior volume taught by Barr therefore is only 12.4% of the lower limit required by applicants' claim 25.

It therefore is apparent that Barr, regardless of how the solid plate 15 is modified by the secondary references, fails to provide any derivative basis for the vaporizer of applicants' claim 25. Claim 25 is accordingly patentably distinguished over Barr in view of Stall and/or Greer, as is claim 26 dependent thereunder.

Concerning the rejection of claims 2 and 9 under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Stall and/or Greer in further view of Tanabe, Tanabe has been cited for teaching of a thermocouple to measure temperature of a vaporizer for feedback control of vaporizer temperature, with the Office Action thereupon asserting that it would be obvious to control the vaporizer of Barr,

Stall and/or Greer with such thermocouple. Such importation of the thermocouple of Tanabe does not, however, provide any basis for the resultingly modified vaporizer of Barr, Stall and/or Greer to possess:

“the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume”

that is required by claim 1, from which claims 2 and 9 depend.

Claims 2 and 9 therefore are patentably distinguished over the combination of Barr, Stall and/or Greer in view of Tanabe, for the same reasons as set out hereinabove in support of the patentability of claim 1.

Concerning the rejection of claims 11 and 28 under 35 U.S.C. §103(a) as being unpatentable over Barr in view of Stall and/or Greer in further view of Holloway, the secondary reference Holloway has been cited for teaching of the use of aluminum as a material of construction for a thermally conductive vaporizer. However, since claims 11 and 28 each depends from claim 1 (claim 11 directly and claim 28 indirectly via intervening claim 28), claims 11 and 28 require:

“the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume”

as recited in claim 1. Holloway's teaching of use of aluminum as a fabrication material for thermally conductive heat exchangers does not, however, change the fact that the resulting Barr in view of Stall and/or Greer further in view of Holloway combination still lacks any basis for the feature of:

“the thermally conductive block having an interior volume that comprises (i) said interior space and (ii) an internal volume of said multiplicity of elongated wells, wherein the internal volume of said multiplicity of said wells is from about 1/3 to about 1/2 of the interior volume”

and therefore the claims 11 and 28 are patentable over Barr in view of Stall and/or Greer further in view of Holloway.

In light of the foregoing, all pending claims 1-14 and 25-28 are patentably delineated over the art and are in form and condition for allowance.

Petition for Extension of Time

Petition is hereby made under the provisions of 37 CFR 1.136 for a one month extension of the three months term set out in the November 4, 2005 Office Action, thereby extending the term for reply to March 6, 2006. A credit card authorization form is enclosed, authorizing the payment of \$120 specified in 37 CFR 1.17(a)(1) for such one month extension of time.

Authorization also is hereby given to charge the amount of any additional fee or charge properly payable in connection with the entry of this response, to Deposit Account No. 08-3284 of Intellectual Property/Technology Law.

CONCLUSION

Applicants have satisfied the requirements for patentability of all pending claims 1-14 and 25-28. It therefore is respectfully requested that all of such claims be allowed, and that claims 15-24 be rejoined under the provisions of MPEP 821.04 and be likewise allowed.

In the event that any issues remain, incident to the formal allowance of this application, Examiner Bueker is requested to contact the undersigned attorney at (919) 419-9350 to resolve same, in order that this application may be passed to issue at an early date.

Respectfully submitted,



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